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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

SOWARD, IDA M

ART UNIT PAPER NUMBER

2822

DATE MAILED: 02/28/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/955,677

Applicant(s)

HSIA ET AL.

Examiner

Ida M Soward

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 December 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

This Office Action is in response to the Applicants' amendment filed December 12, 2002.

Claim Objections

The objection to claims 9 and 15-16 has been withdrawn due to the amendment filed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3 and 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Prior Art Figures 1a-3b in view of Gutsche et al. (US 6,177,353 B1).

Prior Art Figures 1a-3b teach a semiconductor workpiece, comprising: a metal layer **314** an organic ARC layer **312** disposed on the metal layer; a photoresist layer **310** disposed on the ARC layer opposite the metal layer; a barrier layer **316** disposed on the metal layer opposite the ARC layer; a metallic stack; and residual photoresist **326 & 328**. However, Prior Art Figures 1a-3b fail to teach an inorganic dielectric ARC layer functioning as a hard mask. Gutsche et al. teach a silicon oxynitride inorganic

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dielectric ARC layer **510** functioning as a hard mask (Figure 5, col. 5, lines 21-58).

Since Admitted Prior Art Figures 1a-3b and Gutsche et al. are both from the same field of endeavor (semiconductor structures having ARC layers), the purpose disclosed by Gutsche et al. would have been recognized in the pertinent art of Admitted Prior Art Figures 1a-3b. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor workpiece of Prior Art Figures 1a-3b by incorporating the hard mask ARC layer as taught by Gutsche et al. to reduce erosion.

Claims 7-8 and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art Figures 1a-3b and Gutsche et al. (US 6,177,353 B1) as applied to claims 1-3 and 9-11 above, and further in view of Iyer et al. (6,121,133).

Admitted Prior Art Figures 1a-3b and Gutsche et al. teach all mentioned in the rejection above. However, Admitted Prior Art Figures 1a-3b and Gutsche et al. fail to teach photoresist thickness. Iyer et al. teach a photoresist thickness of 0.7 to 1 microns (col. 7, lines 49-52), which falls in the ranges 0.1 to 2, and 0.6 to 1 microns. Iyer et al. further teach an oxide layer **202** formed on a wafer **200**; at least one microelectronic structure extending from the oxide layer; a barrier layer **226** disposed on the oxide layer (col. 2, lines 55-56). In regard to layers being deposited by PECVD, note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hira, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does

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not deal with this issue); In re Fitzgerald, 205 USPQ 594, 596 (CCPA); In re Marosi et al., 218 UPSQ 289 (CAFC); and most recently, In re Thorpe et al., 227 UPSQ 964 (CAFC, 1985) all of which make it clear that it is the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that Applicant has burden of proof in such cases as the above case law makes clear. Since Admitted Prior Art Figures 1a-3b, Gutsche et al. and Iyer et al. are from the same field of endeavor (semiconductor structures having ARC layers), the purpose disclosed by Iyer et al. would have been recognized in the pertinent art of Admitted Prior Art Figures 1a-3b and Gutsche et al. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor workpiece as of Admitted Prior Art Figures 1a-3b and the hard mask ARC layer of Gutsche et al. by incorporating the photoresist thickness as taught by Iyer et al. to eliminate particle contamination.

Claims 4-6 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art Figures 1a-3b and Gutsche et al. (US 6,177,353 B1) as applied to claims 1-3 and 9-11 above, and further in view of Torek et al. (US 6,200,909 B1).

Admitted Prior Art Figures 1a-3b and Gutsche et al. teach all mentioned in the rejection above. However, Admitted Prior Art Figures 1a-3b and Gutsche et al. fail to teach an ARC layer having a substantially uniform thickness over topical non-planarities

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on a layer. Torek et al. teach an ARC layer **24** having a substantially uniform thickness over topical non-planarities on a layer **20** (Figure 3, col. 3, lines 1-59). In regard to layers being deposited by CVD and PECVD, note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); In re Fitzgerald, 205 USPQ 594, 596 (CCPA); In re Marosi et al., 218 UPSQ 289 (CAFC); and most recently, In re Thorpe et al., 227 UPSQ 964 (CAFC, 1985) all of which make it clear that it is the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that Applicant has burden of proof in such cases as the above case law makes clear. Since Admitted Prior Art Figures 1a-3b, Gutsche et al. and Torek et al. are from the same field of endeavor (semiconductor structures having ARC layers), the purpose disclosed by Torek et al. would have been recognized in the pertinent art of Admitted Prior Art Figures 1a-3b and Gutsche et al. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor workpiece of Admitted Prior Art Figures 1a-3b and the hard mask ARC layer of Gutsche et al. by incorporating the uniform thickness as taught by Torek et al. to prevent overexposure of the photoresist.

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Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Admitted Prior Art Figures 1a-3b and Gutsche et al. (US 6,177,353 B1) as applied to claims 1-3 and 9-11 above, and further in view of Huang et al. (6,166,427).

Admitted Prior Art Figures 1a-3b and Gutsche et al. teach all mentioned in the rejection above. However, Admitted Prior Art Figures 1a-3b and Gutsche et al. fail to teach metallic stack thickness of about 1,000 to 20,000 and 5,000 to 8,000 Angstroms. Huang et al. teach metallic stack thickness of about 8,000 to 10,000 Angstroms that falls in the ranges 1,000 to 20,000 and 5,000 to 8,000 Angstroms (col. 4, lines 1-3). Since Admitted Prior Art Figures 1a-3b, Gutsche et al. and Huang et al. are from the same field of endeavor (semiconductor structures having ARC layers), the purpose disclosed by Huang et al. would have been recognized in the pertinent art of Admitted Prior Art Figures 1a-3b and Gutsche et al. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor workpiece of Admitted Prior Art Figures 1a-3b and the hard mask ARC layer of Gutsche et al. by incorporating the metallic stack thickness as taught by Huang et al. to improve device performance.

Response to Arguments

Applicant's arguments with respect to claims 1-20 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents are cited to further show the state of the art with respect to semiconductor structures having inorganic dielectric ARC layers functioning as hard masks:

Lee et al. (5,968,711)

Liu et al. (US 6,277,745 B1)

Yu et al. (6,013,570)

Zheng et al. (5,858,870).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ida M Soward whose telephone number is 703-305-3308. The examiner can normally be reached on Monday - Thursday, 6:30 am to 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 703-308-4905. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

ims
February 13, 2003



AMIR ZARABIAN
SUPERVISORY PATENT EXAMINER
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